

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### Method of Producing a Pulverulent Fat-Soluble Vitamin-Containing Preparation for Incorporation into Animal Feeds

I, KNUD ABILDGAARD-ELLING, a Danish Subject, trading as LOVENS KEMISKE FABRIK ved. A. Kongsted, of 19, Bronshøjvej, Copenhagen, Denmark, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a method of producing a pulverulent fat-soluble vitamin-containing preparation for incorporation into animal feeds.

15 Pulverulent or granular preparations are known which consist of a solid substance, such as gelatine, confining particles or drops of a fat-soluble vitamin or a solution of the same in a fatty substance. In such preparations the vitamin is more or less protected

20 against the oxidizing effect of the air, which is capable of penetrating the protecting layer of the solid substance only to a limited extent.

25 As is also known, such preparations of fat-soluble vitamins may be employed for mixing into animal feeds in order to add to such feeds a content of such vitamins, especially vitamins A and D, in a comparatively stable form. However, when

30 employed for this purpose, these preparations appear to have the disadvantage that owing to the circumstance that the size and the character of the surface of the particles are different from those of the particles in

35 animal feeds, it is difficult to distribute them uniformly in the animal feeds and keep them in such distribution. Moreover, the production of the said preparations is rather troublesome as the gelled particles

40 formed by cooling must be treated with care in order to avoid their deformation during the formation of a new surface and uncovering of the vitamin-containing components, and the drying of the particles calls for a

45 special operation, in most cases a drying

process on trays or fine-mesh nets.

The present invention relates to a method for the production of a preparation of the aforementioned kind for mixing into animal feeds and aims at obviating the foregoing disadvantages. This method mainly consists of emulsifying the vitamin-active substance or substances or concentrations of such substances in a warm aqueous concentrated solution of a colloidal hydrophilic organic substance, which emulsion is then finely dispersed and immediately afterwards dried on a pulverulent carrier substance consisting of plant tissue, while the said carrier substance is kept in a fluidized state by an upwardly directed current of the air used for the drying.

Examples of colloidal hydrophilic organic substances which may be employed in carrying out the invention are soluble starch derivatives, gums such as gum arabic, cellulose-esters and -ethers, carboxyl-methyl- and carboxy-ethyl cellulose. Glue and especially gelatine have proved particularly suitable. Among the suitable carrier substances can be mentioned flour from cereals, alfalfameal and ground extract residues or pressing residues from oil-containing seeds.

The herein described method may advantageously be carried out in a downwardly tapering conical container with a vertical axis through or near the end of which taper an upwardly directed stream of hot air is blown, leaving the container through an exit conduit, connected with the upper part thereof. When a suitable amount of the carrier substance is introduced into the container, the stream of air will keep the substance in a fluidized state, so that at any rate the greater part of the carrier substance is thus carried by the air up to a certain level, and the amount of the carrier substance in the container may be adapted in such a way to the quantity of air introduced per minute that the said level is sufficiently

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far below the exit conduct to cause the air to entrain only a small amount of the carrier substance, which, having left the container, can be separated from the air by passing it through an air-filter or a dust collector.

The distribution of the emulsion on the carrier substance can be effected from one or more distribution devices, which are advantageously downwardly directed above the level to which the current of air raises the carrier substance. The distribution devices may for instance be spray nozzles or sprayers provided with fine perforations, through which the emulsion is projected as a stream of droplets. In the course of a space of time, dependent on the amount of the carrier substance introduced into the container, the said substance will contact the droplets in such a way that the two substances form a material which is suspended in the air, and the particles of which consist of one or more drops, among and about which particles of the carrier substance are disposed.

When this has taken place the introduction of the emulsion to the distribution devices is stopped whilst continuing to blow in air. The evaporation of water from the emulsion distributed on the carrier substance, which has commenced as soon as the emulsion has been projected by the distribution devices, continues and this drying is carried on until the product possesses the desired water content. The supply of hot air into the container is then stopped, which causes the material suspended in the air to accumulate in the lower part of the container, from whence it is removed. In order to facilitate the removal of the material from the container, it is advisable to close the same by a horizontally slidable plate.

It has been found that the pulverulent preparations produced in accordance with the invention can easily be distributed quite uniformly in all the generally used ground and finely crushed animal feeds and mixtures of such feeds, and that the preparation is not liable to separate from this uniform mixture. It has moreover been found that the losses of fat-soluble vitamins in the animal feeds in which the preparations produced by the herein described method have been mixed are insignificant in the periods during which animal feeds are usually kept by the producer, the dealer and the consumer.

#### Example

9.00 kg. of gelatine, 1.40 kg. of saccharose and 2.40 kg. of glucose are dissolved whilst heating, in 26 litres of boiled distilled water. (It appears that an admixture of sugars in the gelatine increases the stability of the content of vitamin A in the preparation). After cooling, 5.00 kg. of a mixture of the

palmitate of vitamin A and groundnut-oil are emulsified into this solution, which mixture then contains 1 million of international units (i.u.) of vitamin A per gram. Before the mixture is emulsified into the solution, 5 grams of propyl gallate are added to the mixture in order to protect the vitamin against oxidation during the subsequent operations.

In an apparatus the container of which consists of a lower conical part of a height of 2 m. and a maximum diameter of 3 m. and an upper cylindrical part of the same diameter and a height of 1 m. connected thereto, 240 kg. of wheat flour are introduced and kept in a fluidized state in the conical part of the container by a current of air of 35°C., blown in by means of a centrifugal blower. The capacity of the blower is 30 cubic metres of air per minute at a pressure of 380 mm. water column.

The vitamin-containing emulsion is then distributed on the wheat flour during 30 minutes through a downwardly directed spraying-pistol of the kind used for lacquering centrally disposed beneath the lid of the container. Thereafter, the hot air is blown in for another 30 minutes, whereafter the admission of air is stopped and the dried product removed from the container. The preparation contains 10% water and consists of particles having an average diameter of about 1 mm. The content of vitamin A in the preparation is 20,000 i.u. per g. For the determination of the stability of the content of vitamin A in the preparation when mixed into an animal feed, 1 part by weight of the preparation is mixed with 99 parts by weight of a chicken fodder composed as follows:

|                        |                   |      |
|------------------------|-------------------|------|
| Buttermilk             | Ground oats       | 10%  |
| powder 3%              | Oat flour         | 10%  |
| Whey powder 2%         | Alfalfa meal      | 7%   |
| Meat and bone meal 15% | Wheat bran        | 15%  |
| Herring meal 3%        | Sodium chloride   | 0.5% |
| Dried yeast 2%         | Calcium carbonate | 1.5% |
| Linseed meal 4%        | Wheat flour       | 15%  |
| Ground barley 12%      |                   |      |

It is emphasised that the content of vitamin A, 200 i.u. per gram, in the vitaminized animal feed is considerably higher than that usually employed in practice, but that essentially lower content of vitamin A in the animal feed would involve too high uncertainty in the determination of the vitamin content. After the chicken fodder mixed with the preparation has been stored for one year at usual temperature and in air of normal moisture content, the content of vitamin A in the fodder is found to be 180 i.u. per gram, and thus during a year the loss of vitamin A amounts to only about 10% of the amount of vitamin A originally contained in the fodder.

What I claim is —

1. A method of producing a pulverulent preparation for incorporation into animal feeds and containing one or more fat-soluble vitamins or vitamin-active derivatives thereof in a form protected against oxidation, which comprises emulsifying the vitamin-active substance or substances or concentrates thereof in a hot concentrated aqueous solution of a colloidal hydrophilic organic substance, thereupon finely dispersing said emulsion and immediately afterwards drying same on a pulverulent carrier substance consisting of plant tissue while said carrier substance is maintained in a fluidized condition by an upwardly directed current of drying air. 15
2. The method of producing a pulverulent preparation for incorporation into animal feeds, substantially as described with reference to the foregoing Example. 20

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